ANNUAL REPORT 1965

SAULT STE. MARIE

water pollution control plant

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Sault Ste. Marie Local Advisory Committee,
City of Sault Ste. Marie.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Sault Ste. Marie Water Pollution Control Plant, OWRC Project No. 58-S-20.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Sault Ste. Marie Water Pollution Control Plant, OWRC Project No. 58-S-20.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

SAULT STE. MARIE
water pollution control plant
operated for

THE CITY OF SAULT STE. MARIE

by the

ONTARIO WATER RESOURCES COMMISSION

'65 REVIEW

During 1965 the daily average flow to the plant was 7.75 mgd or 96% of plant capacity.

Although the cost of operation in 1965 was almost 9% more than in 1964, the unit cost of treatment was reduced by $3.05 per million gallons or 7% while the cost per pound of BOD removed was reduced 7¢ a reduction of some 40% over 1964.

Although the flow exceeded design capacity of 8 mgd some 30% of the time the strength of the raw sewage was weak, indicating infiltration of storm and ground water into the sanitary sewer system.

Operation of the vacuum filters continued at high efficiency. Running time for both filters was approximately 38 hours per week.

Considerable staff time was spent on operation of the Clark Creek and Pim Street sewage pumping stations during storm flows. These stations, especially Clark Creek, do not have sufficient electrically driven pump capacity to handle high flows.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1952 – 1965

In 1952, the City of Sault Ste. Marie and the Townships of Korah and Tarentorus jointly decided to select a consultant to submit a report dealing with an interceptor sewer system, which would collect sewage from all three municipalities and dispose of it at a central location.

This original report on the Integrated Sewage Works was submitted in November 1953 by Proctor and Redfern, Consulting Engineers. The recommendations contained were adopted by the municipalities and they proceeded with the first stage of the four stage program. This first stage, consisting of a sanitary interceptor running east from Goulais Avenue to John Street, was completed in 1955 at a cost of approximately $437,000.

By the spring of 1958, the three municipalities had completed negotiations with the OWRC for the three remaining stages of the integrated system. The Ontario Municipal Board gave its conditional approval in June 1958.

Tenders were called on the second stage of construction in November 1958. This stage included all sewers and force mains between John Street and the site of the present sewage treatment plant. Previously tenders had been called on part of this stage, the section between John Street and Pim Street. However, due to the lack of contractor interest and high unit prices, it was decided to re-tender, this time including all the proposed trunk sewers and force mains under one specification in two parts, Contracts A and B. Keystone Construction Ltd. of Windsor was awarded Contract A at $709,925.51, and Beaver Construction Company Limited of Montreal was awarded Contract B at $652,249.00. These were the lowest of a total of seven bidders.

Both of the second stage contracts were completed in March 1961 at a total cost of $1,301,117.51, not including engineering fees, etc.

Tenders were received on May 20, 1960 for both the third and fourth stages of the integrated system.

The third stage was divided into two contracts, C and D. Contract C was for the construction of the Pim Street Pumping Station and Contract D was for the construction of the Clark Creek Pumping Station. L. R. Brown Company Ltd. of Sault Ste. Marie, which was the lowest of five bidders, was awarded both contracts at $468,534.00. This stage was completed in October 1961 at a cost of $459,691.42. In addition, approximately $67,707.00 was spent on equipment and $34,856.00 for engineering fees, etc.

The fourth stage, which consisted of the primary treatment plant and the outfall sewer, was awarded to Matthews Concrete Limited of London at $825,873.00, the lowest of seven bids. This contract was completed on February 8, 1962 at a cost of $801,334.74. The additional costs of this stage include an equipment cost of approximately $240,294.00 and $76,756.00 for engineering fees, etc.

The integrated system commenced operation as a complete unit on February 9, 1962 and was officially opened on June 6, 1962 by Mr. A. M. Snider, Chairman of the OWRC, Mayor J. L. McIntyre of Sault Ste. Marie, Reeve D. W. Murray of Tarentorus Township and Reeve J. A. Allen of Korah Township.

Project Staff

Mr. George Buckley
Superintendent

Plant Mechanic	R. J. Burns
Mechanics Helper	R. L. McKinley
Filter Operator	R. A. Nicholson
Shift Operators	G. S. Adams
	L. H. Cook
	J. Lappage
	R. S. Welton
	D. McPherson *
Groundskeeper	J. E. Bray

* Position filled January 1, 1966

COMMENTS

The water pollution control plant, supervised for 16 hours per day, is well maintained and kept in good condition both as to appearance and mechanical elements. Mr. Buckley and his staff are to be commended for their efforts.

Description of Project

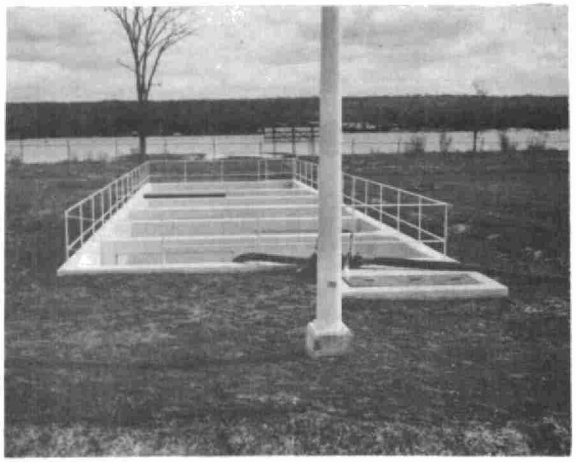
INFLUENT WORKS

Influent to the plant is metered in a Parshall flume before undergoing any treatment. At times when the flow exceeds the capacities of the treatment units, the excess can be by-passed over a fixed weir. This by-pass flow is coarse screened to remove large solids.

The first processes in the treatment process take place in the detritor building where the flow passes through one of two barminutors and thence through one of two detritors. The barminutors collect and cut up the larger particles then return the shreddings to the flow. The detritors reduce the velocity of the flow allowing grit, sand, gravel and silty material to settle out. A revolving collector mechanism at the bottom of the detritor draws the settled material to a sump from which a reciprocating rake lifts the material to a gantry bucket for disposal. The rake channel is equipped with two organic return pumps which return the suspended organic material back to the flow.

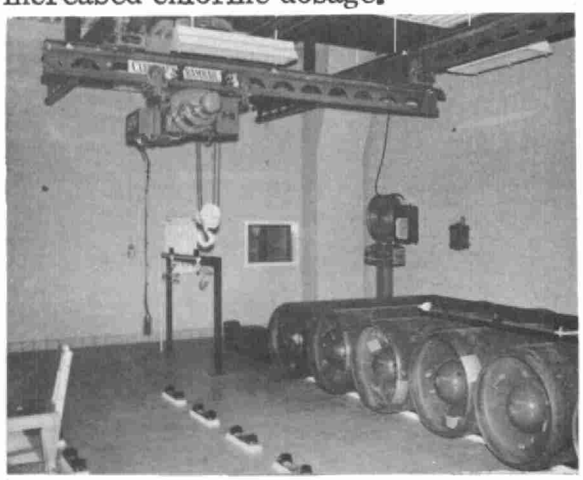
PRIMARY SEDIMENTATION TANK

From the detritor the flow is discharged via a distribution chamber to the four primary sedimentation tanks. Here the flow is detained to allow the heavier solids to settle to the bottom of the tank. The settled solids, or sludge, is removed by revolving mechanical scrapers and is pumped to a holding tank for further processing. The scum which collects on the surface of the settling tanks is removed by skimmer mechanisms and after dewatering is also pumped to the sludge holding tanks.



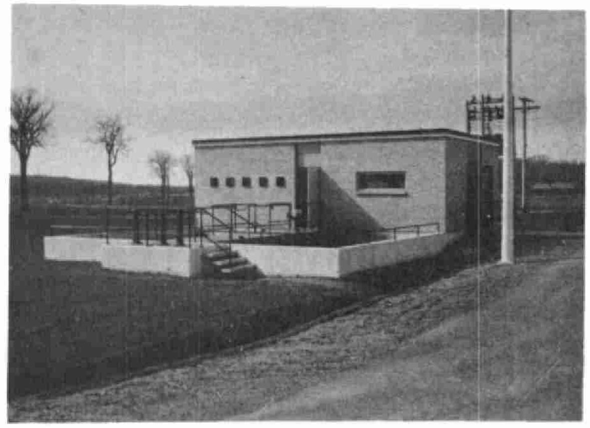
CHLORINE CONTACT CHAMBER

The effluent from the primary tanks flows by gravity to the chlorine contact chamber. Chlorine is added at this point and following a short detention period in the chamber, the effluent is discharged via a 54" outfall sewer to the St. Marys River. All by-pass flow passes through the chlorine contact chamber and is usually subjected to an increased chlorine dosage.



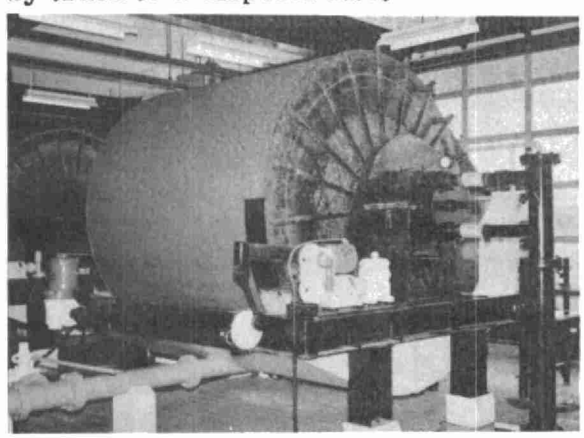
VACUUM FILTRATION

The raw sludge collected by the primary settling tanks is dewatered by one of two vacuum filters. To operate these units efficiently, they must have a sufficient



supply of sludge to run continuously for several hours. Since it is not practical to allow enough sludge to build up in the primary tanks to permit this continuous operation, sludge holding tanks have been employed to retain sludge. These holding tanks are aerated to prevent the raw sludge from becoming septic during its detention period prior to filtration.

Immediately before filtering, the raw sludge is pre-conditioned with coagulants, lime and ferric chloride, which assist in compacting the sludge on the filter surface. The dewatered sludge or filter cake is discharged to a conveyor which transports it to a skiphoist. The skip raises the filter cake to a hopper for storage until it can be hauled by truck to a disposal site.



PROJECT COSTS

NET CAPITAL COST (Final)		$3,244,149.35
DEDUCT - Portion Financed by CMHC (Final)	$2,145,572.61	
- Payments from Municipalities	2,900.00	2,148,472.61
Long Term Debt to OWRC		$1,095,676.74
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965		$ 99,605.10
Net Operating		$ 122,349.41
Debt Retirement		22,110.00
Reserve		21,191.67
Interest Charges		61,404.32
TOTAL		$ 227,055.40

RESERVE ACCOUNT

Balance at January 1, 1965	$ 67,896.74
Deposited by Municipality	21,191.67
Interest Earned	4,091.31
	$ 93,179.72
Less Expenditures	(6,633.76)
Balance at December 31, 1965	$ 86,545.96

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	5079.27	3992.59		14.95			92.08		27.07	939.24	13.34
FEB	9658.43	4117.91		717.54	2921.87	677.16	38.89	17.45		1065.11	102.50
MARCH	7382.87	4029.21		401.28	1010.52	101.97	346.20	339.36	153.21	914.48	86.64
APRIL	10238.21	4407.10		265.26	1826.42	677.16	240.51		235.32	2497.14	89.30
MAY	10630.50	5505.67	675.76	350.19	2148.75		120.28		596.27	1105.74	127.84
JUNE	9657.52	3291.18	684.16	178.15	665.06	3034.15	246.72		87.28	1381.32	89.50
JULY	10577.68	4048.83	91.20	121.75	1021.99	1109.58	242.97	89.75	2897.05	806.02	148.54
AUG	10127.21	3963.82	729.60	15.62	1585.53	1779.22	124.01	158.91	561.79	1011.66	197.05
SEPT	17271.37	4097.60	364.79	9.37	1759.50	677.16	388.34	740.53	66.47	8686.25	481.36
OCT	10310.82	5547.47	469.72	304.83	615.17	1233.43	57.24	52.32	1072.33	796.54	161.77
NOV	10080.20	3906.40	375.71		1941.55	677.16	506.31		1277.75	898.84	496.48
DEC	11335.33	3770.56	347.76	592.92	700.36	1300.17	550.75	1200.31	999.51	1688.55	184.44
TOTAL	122349.41	50678.34	3738.70	2971.86	16196.72	11267.16	2954.30	2598.63	7974.05	21790.89	2178.76

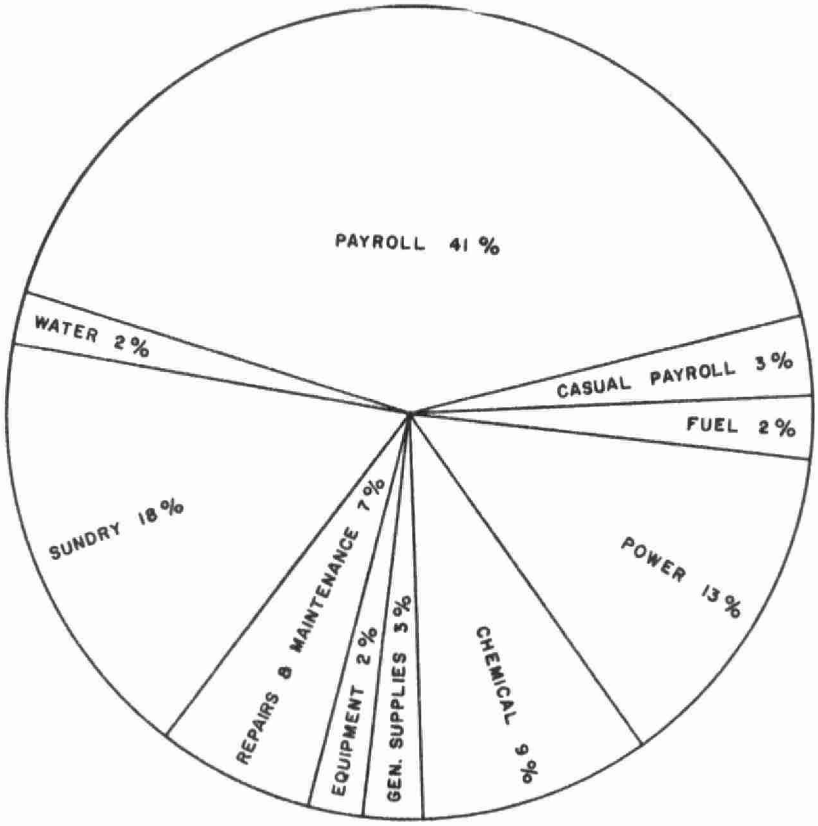
* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $9997.50

YEARLY OPERATING COSTS

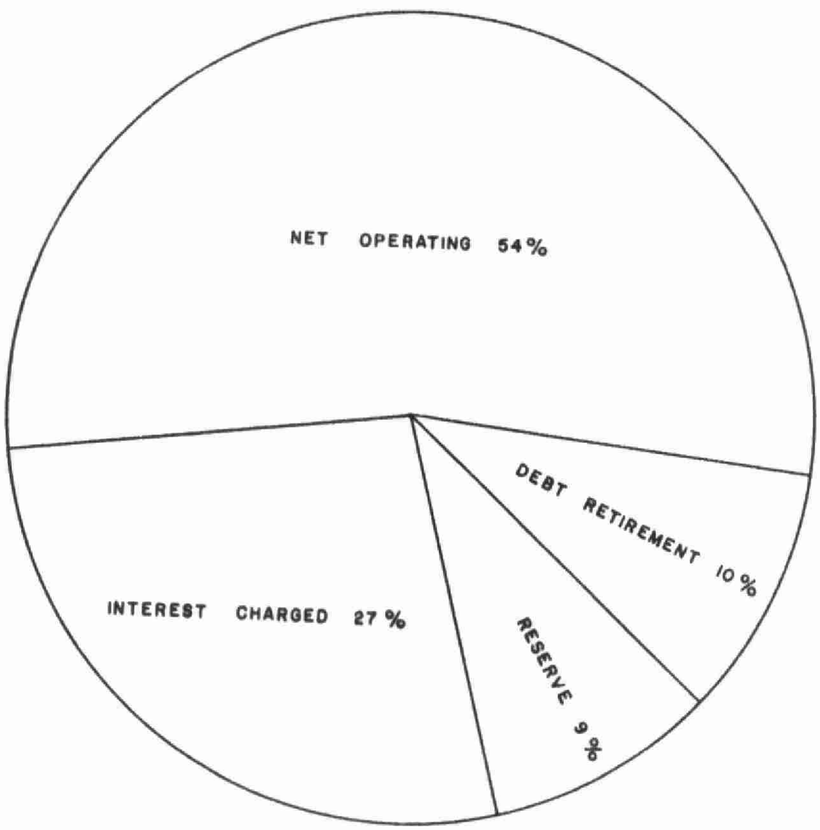
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER LB. OF BOD REMOVED
1962	** 1601.26	$ 96,491.83	* $ 6.28	$ 57.30	11 CENTS
1963	1764.94	107,538.08	6.75	61.00	10 CENTS
1964	2432.62	112,623.50	6.32	46.29	12 CENTS
1965	2831.10	122,349.41	6.86	43.22	7 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY
** PLANT STARTED IN FEBRUARY, 1962

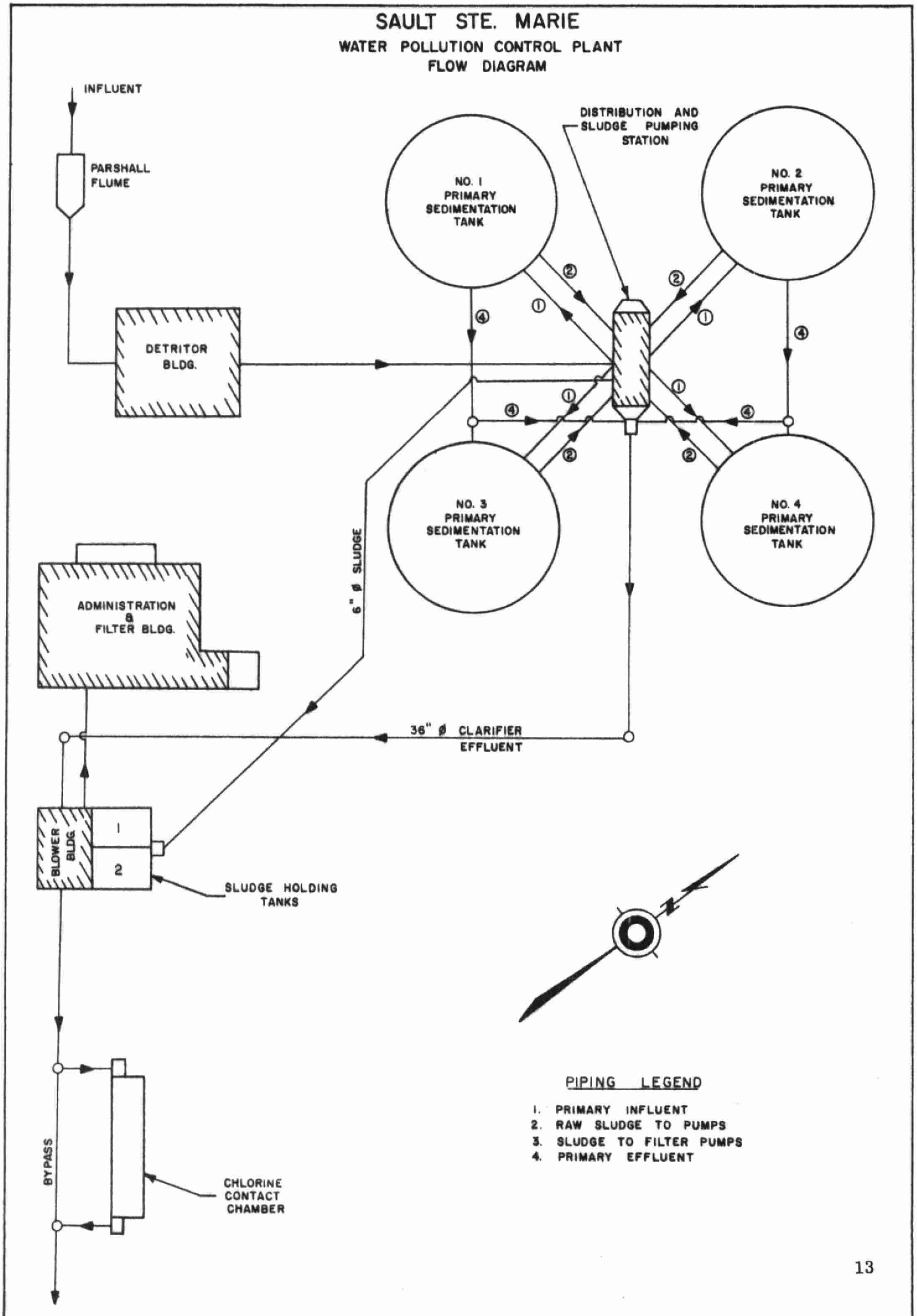
1965 OPERATING COSTS



TOTAL ANNUAL COST



Technical Section


SAULT STE. MARIE
WATER POLLUTION CONTROL PLANT
FLOW DIAGRAM
INFLUENT
PARSHALL FLUME
DETRITOR BLDG.
DISTRIBUTION AND SLUDGE PUMPING STATION
NO. 1 PRIMARY SEDIMENTATION TANK
NO. 2 PRIMARY SEDIMENTATION TANK
NO. 3 PRIMARY SEDIMENTATION TANK
NO. 4 PRIMARY SEDIMENTATION TANK
6" ø SLUDGE
ADMINISTRATION & FILTER BLDG.
36" ø CLARIFIER EFFLUENT
BLOWER BLDG.
1
2
SLUDGE HOLDING TANKS
BYPASS
CHLORINE CONTACT CHAMBER
PIPING LEGEND
1. PRIMARY INFLUENT
2. RAW SLUDGE TO PUMPS
3. SLUDGE TO FILTER PUMPS
4. PRIMARY EFFLUENT

Design-Data

GENERAL

Type of Plant - Primary treatment.

Design Population - 72,500 persons.

Design Plant Flow - 8 million gallons per day.

Per Capita Flow - 110 Imperial gallons per day.

Five Day BOD -

Raw Sewage	-	250 PPM
Removal	-	35%

Suspended Solids -

Raw Sewage	-	200 PPM
Removal	-	60%

Pim Street Pumping Station

Pumps -

One Worthington 10,000 GPM at 50 ft. TDH driven by a 165 HP Dorman diesel engine.

Two Worthington each 6,300 GPM at 40 ft. TDH driven by a Brooks 75 HP electric motor.

Control -

A General Services Company Flomatcher variable speed controller coupled to a bubbler system.

Clark Creek Pumping Station

Pumps -

One Worthington 15,400 GPM at 40 ft. TDH driven by a 217 HP Dorman diesel engine.

Two Worthington each 8,400 GPM at 28 ft. TDH driven by a Brooks 75 HP electric motor.

Control -

A General Services Company Flomatcher variable speed controller coupled to a bubbler system.

PRIMARY TREATMENT PLANT

Influent Sewer

Thirty-six inch diameter force main.

Metering

Parshall flume - length 14 ft. 11 in., throat 4 ft.

Screening

Two Chicago Pump Company 36 inch Model C barminutors.

Coarse bar screen in each by-pass channel.

Grit Removal

Two Dorr-Oliver-Long 18 ft. diameter detritors complete with collecting mechanisms.

Grit Removal - Continued

Volume - 6,240 Imperial gallons.

Detention time - 1.13 minutes.

Velocity - 0.209 feet per second.

Primary Sedimentation Tanks

Four Dorr-Oliver-Long 70 ft. diameter "Squarex" clarifiers complete with scum and sludge removal mechanisms.

Volume of each - 36,000 cubic feet or 225,000 Imperial gallons.

Detention time - 2.3 hours at 8 ft. depth.

Surface Settling Rate - 520 Imperial gallons per sq. ft. per day.

Weir Overflow Rate - 13,000 Imperial gallons per lineal foot per day.

Chlorine Contact Chamber

One Wallace and Tiernan V-notch gas chlorinator. Maximum dosage of 800 lbs. per day.

A Cleveland Tramrail Hoist is used to handle the one-ton chlorine cylinders.

A Fairbanks-Morse 9,000 pound scale is used to weigh the one ton cylinders.

Aerated Sludge Holding Tank

Two rectangular tanks 24' x 15' x 11.5'.

Volume of each tank - 4,140 cubic feet or 25,800 gallons.

One Sutorbilt 8 HVB blower, driven by a 2.5 HP General Electric induction motor.

Raw Sludge Vacuum Filtration

Two Komline-Sanderson filters, each complete with conditioning tanks and agitators and driven by a Reeves Varispeed motor.

One Crofts-Bradford gear driven conveyor powered by a Brooks 2 HP electric motor.

One Webster-Smallwood skip hoist powered by a BEPCO 5 HP motor.

Pumps

Four Marlow Plunger Type raw sludge pumps each powered by a 2 HP Leland-Newman motor.

Two Komline-Sanderson Plunger Type sludge pumps rated at 60 GPM and each powered by a 1 1/2 HP C. G. E. induction motor.

Two Komline-Sanderson diaphragm type lime pumps rated at 20 GPM and each powered by a 1/4 HP Reeves motor.

Two Komline-Sanderson diaphragm type ferric chloride pumps rated at 20 GPM and each powered by a 1/4 HP Reeves motor.

Two Aurora condensate pumps rated at 75 GPM and each powered by a Bull-E. R. & F. Turner Ltd. 2 HP motor.

Two Nash Hytor vacuum pumps each powered by a 30 HP British Thomson-Houston Company motor.

Two Dorr-Oliver-Long organic return pumps each powered by a 1/2 HPA Westinghouse motor.

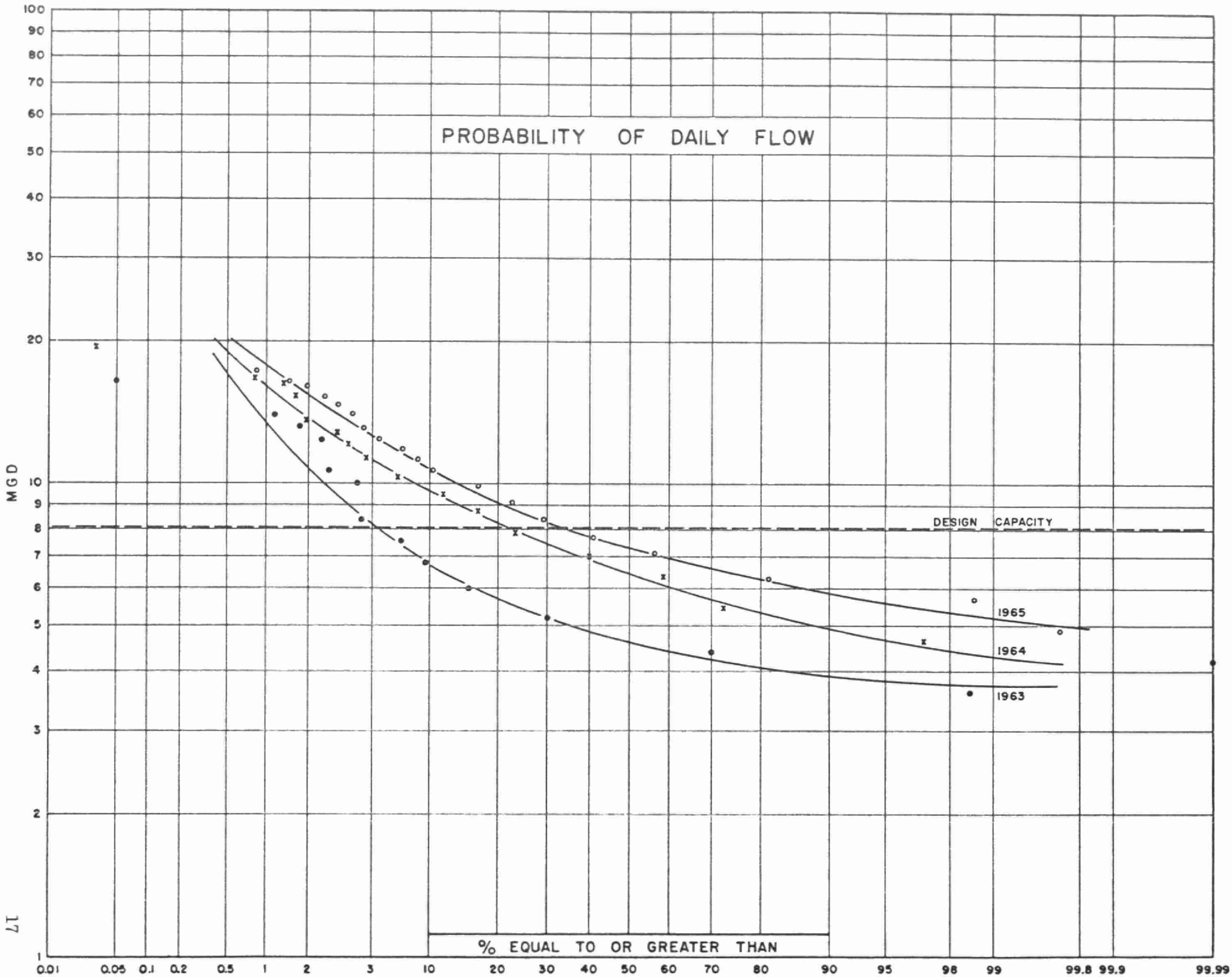
Two Smart-Turner sump pumps each powered by a 5 HP C. G. E. motor.

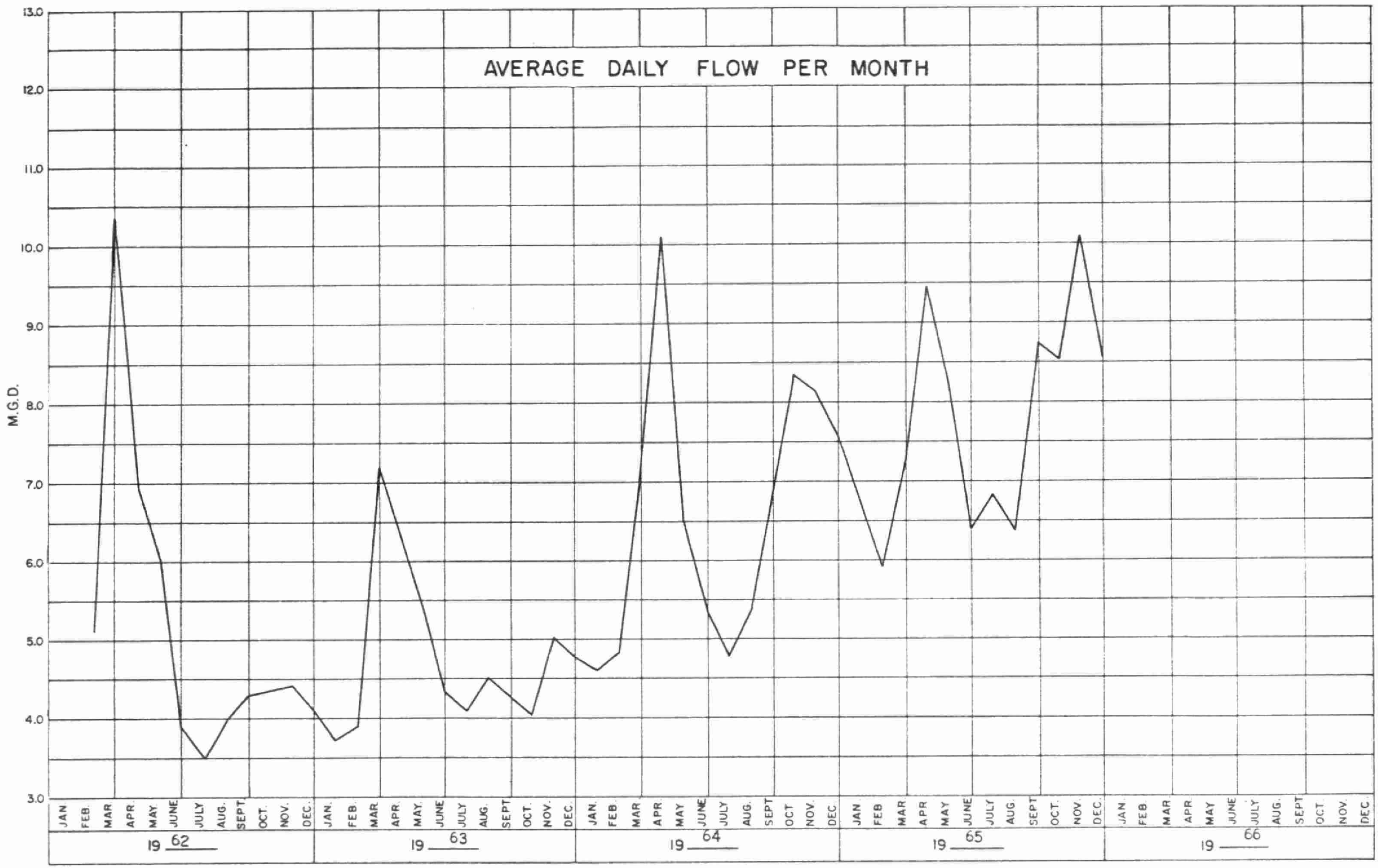
Process Data

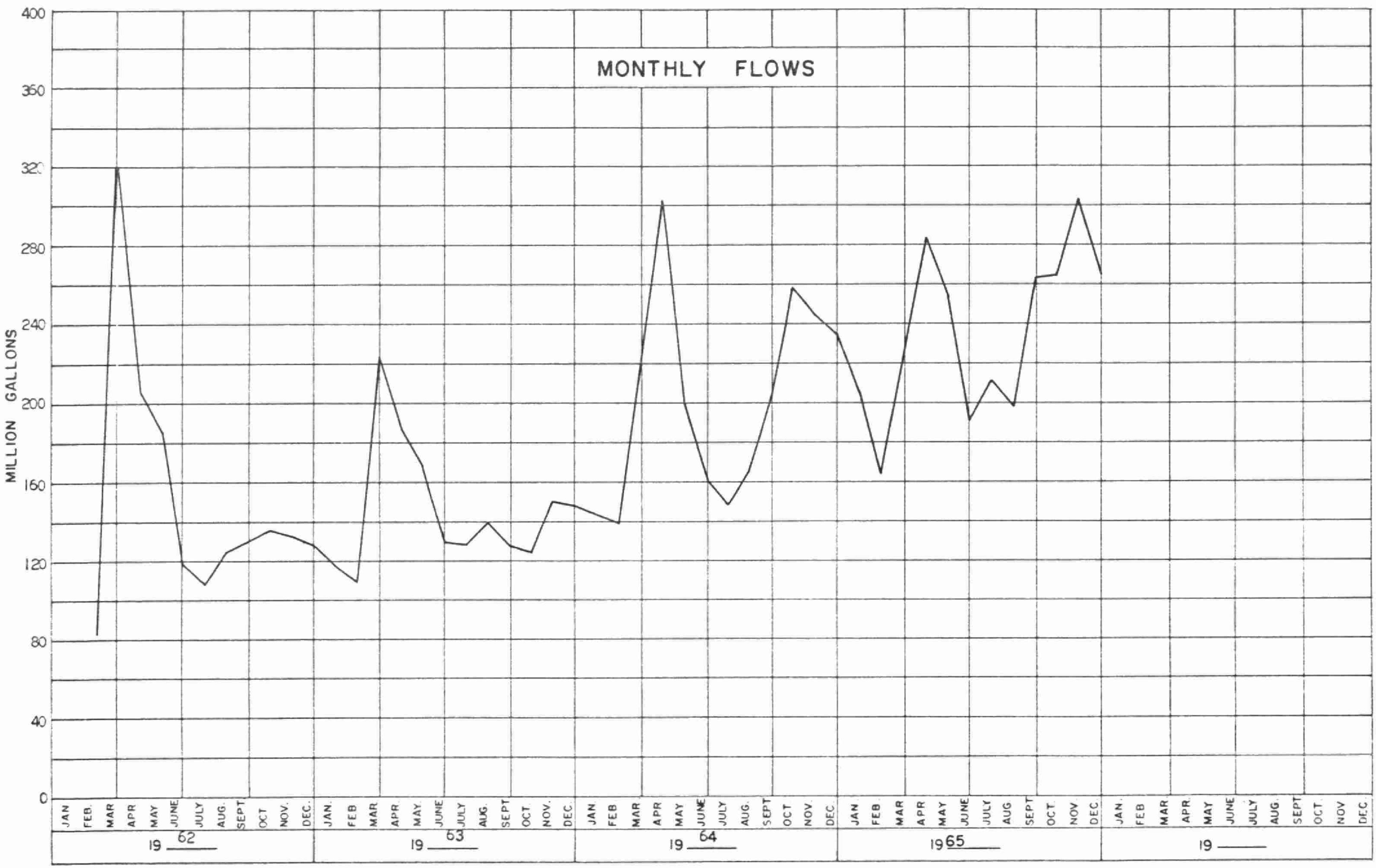
Flows are increasing yearly by a considerable amount. In 1963 the plant was overloaded 5% of the time. In 1964 the plant was overloaded 24% of the time. In 1965 the plant was overloaded 34% of the time.

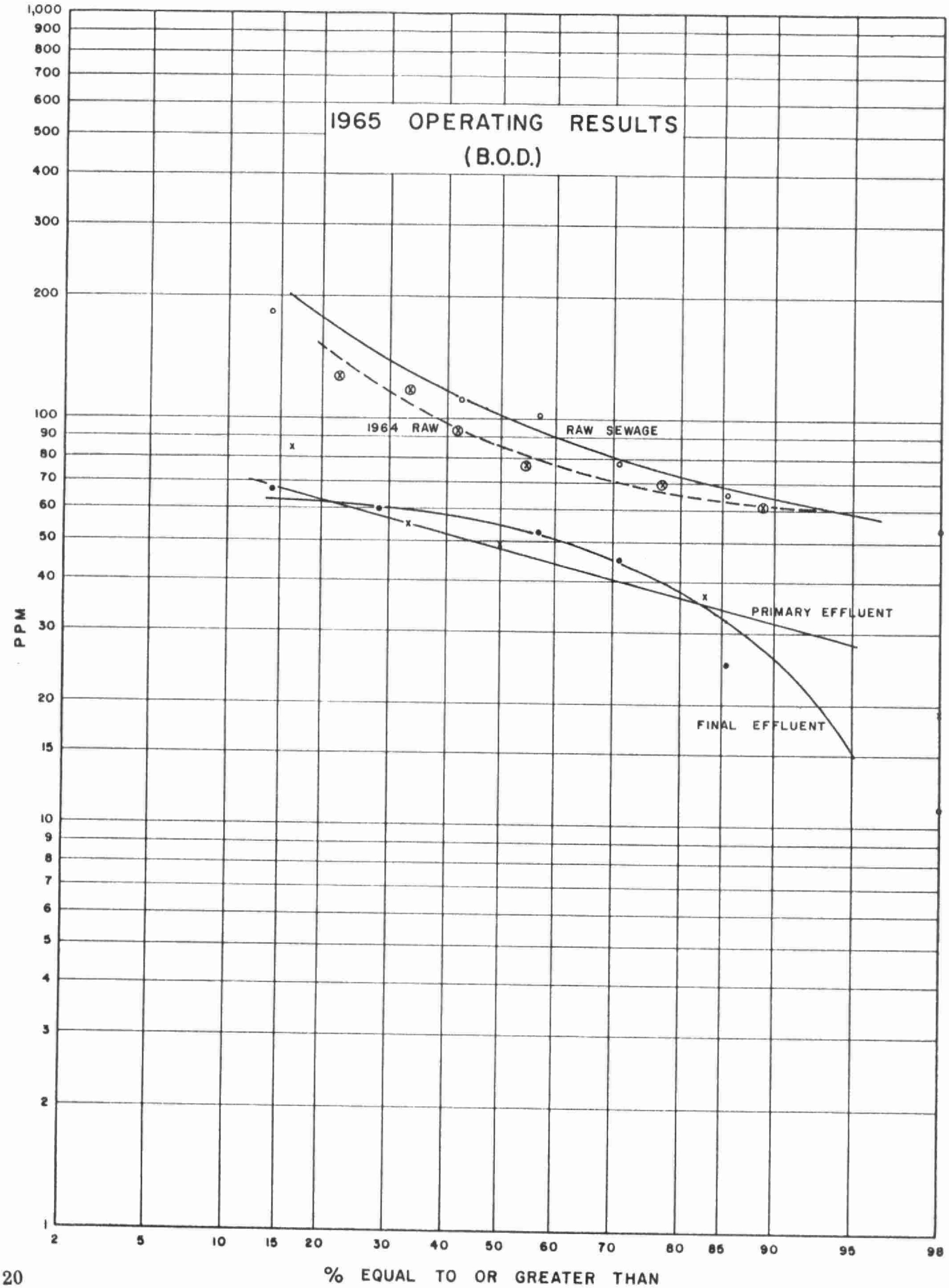
There are periods of high flow in spring and fall when the flow exceeds the plant capacity of 8 mgd.

If the present trend continues the dry weather flow will exceed the plant capacity late in 1966.


PROBABILITY OF DAILY FLOW
MGD
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1
DESIGN CAPACITY
1965
1964
1963
% EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
3
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99


AVERAGE DAILY FLOW PER MONTH
M.G.D.
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
JAN. FEB. MAR. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC.
19 62
19 63
19 64
19 65
19 66


MONTHLY FLOWS
MILLION GALLONS
0
40
80
120
160
200
240
280
320
360
400
JAN
FEB.
MAR
APR
MAY
JUNE
JULY
AUG.
SEPT
OCT
NOV.
DEC.
19 62
19 63
19 64
19 65
19


1965 OPERATING RESULTS
(B.O.D.)
1964 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
PPM
1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
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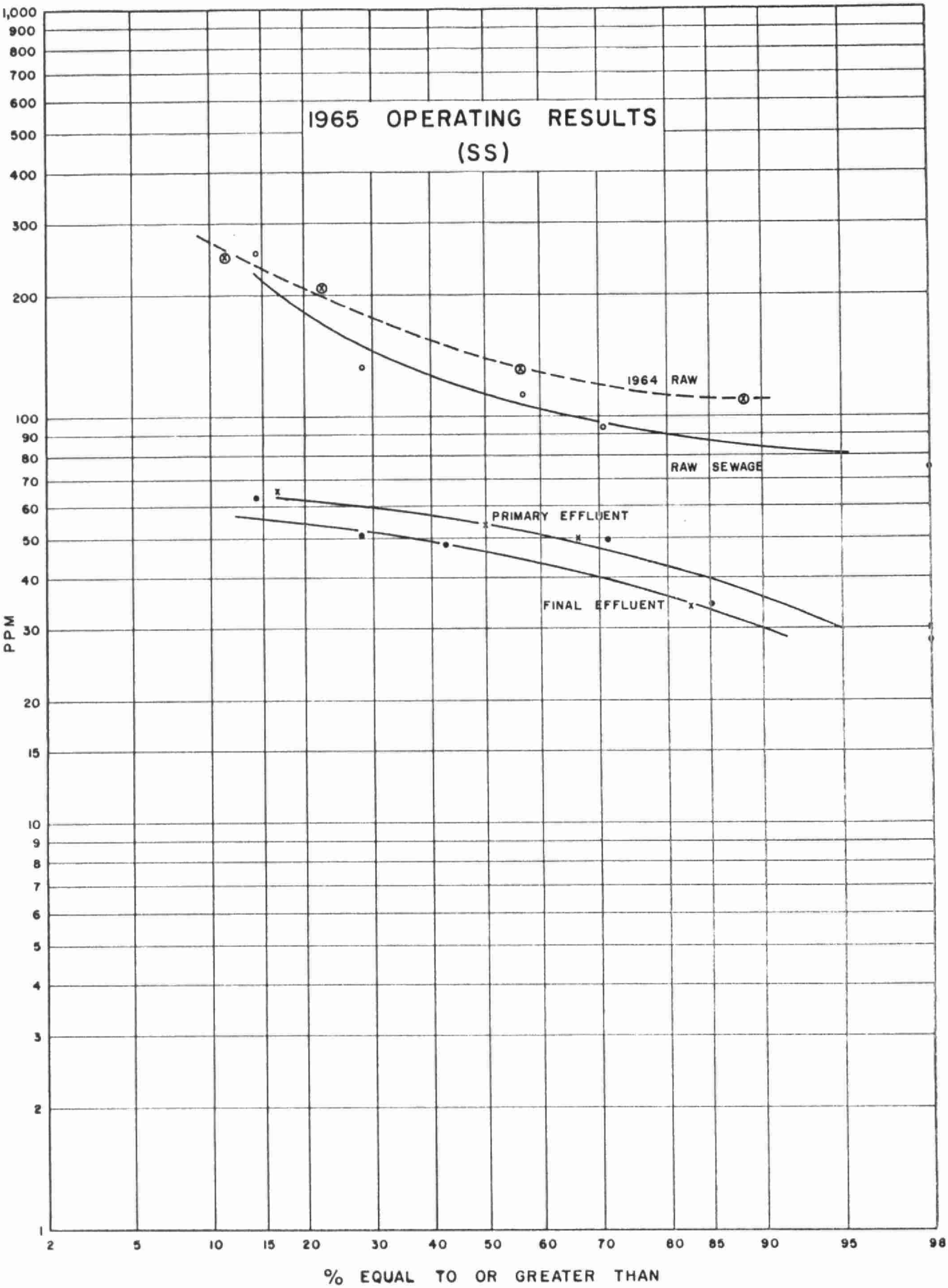
40
50
60
70
80
85
90
95
98
% EQUAL TO OR GREATER THAN


1965 OPERATING RESULTS
(SS)
1964 RAW
RAW SEWAGE
PRIMARY EFFLUENT
FINAL EFFLUENT
PPM
1,000
900
800
700
600
500
400
300
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100
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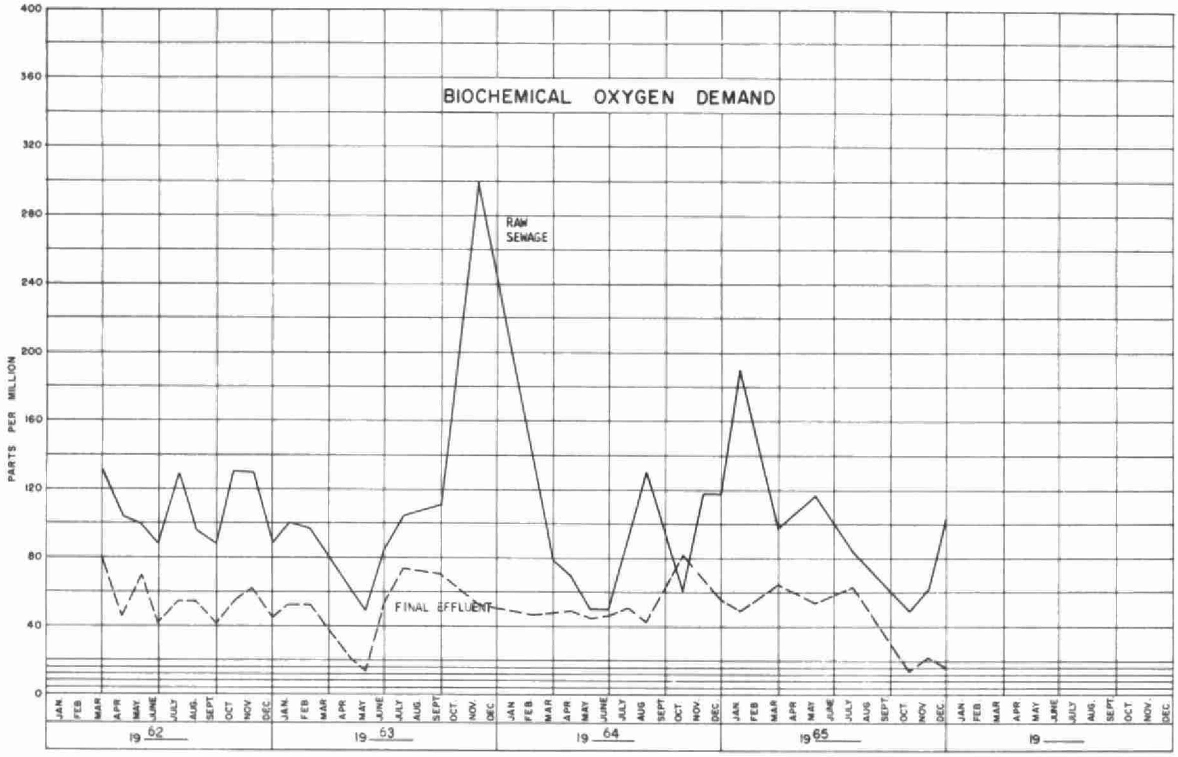
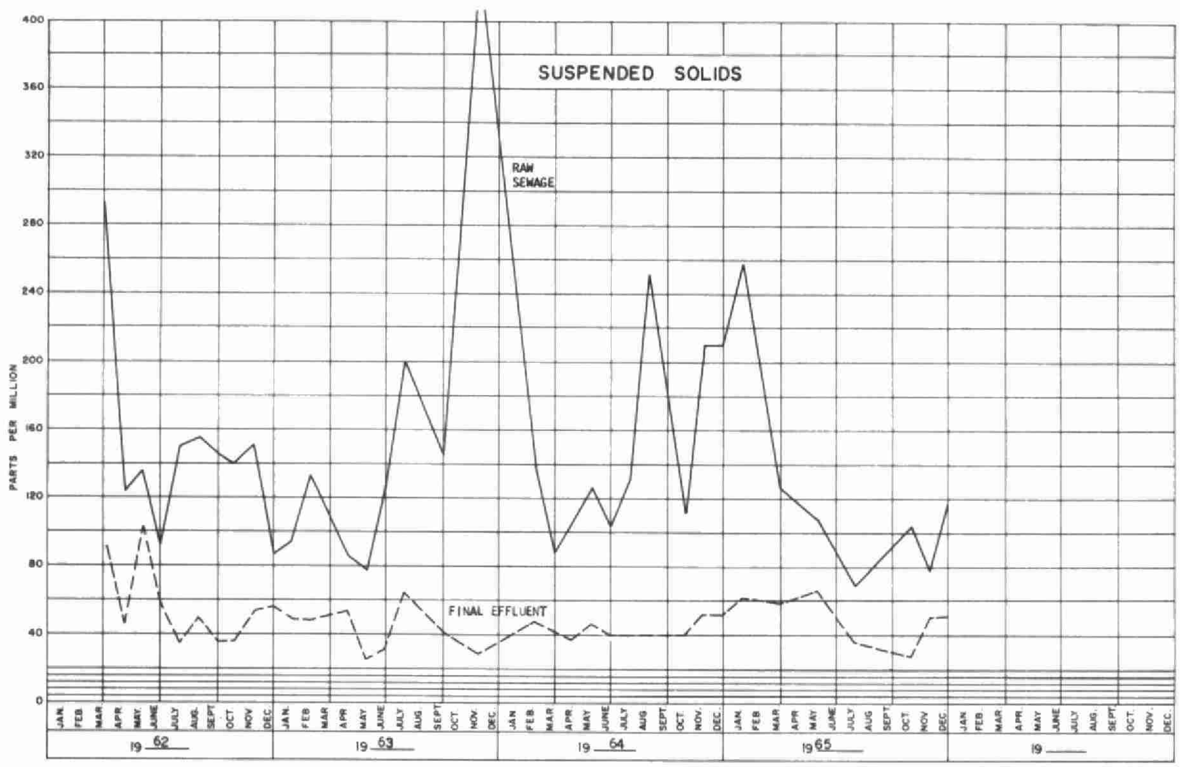
98
% EQUAL TO OR GREATER THAN



MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

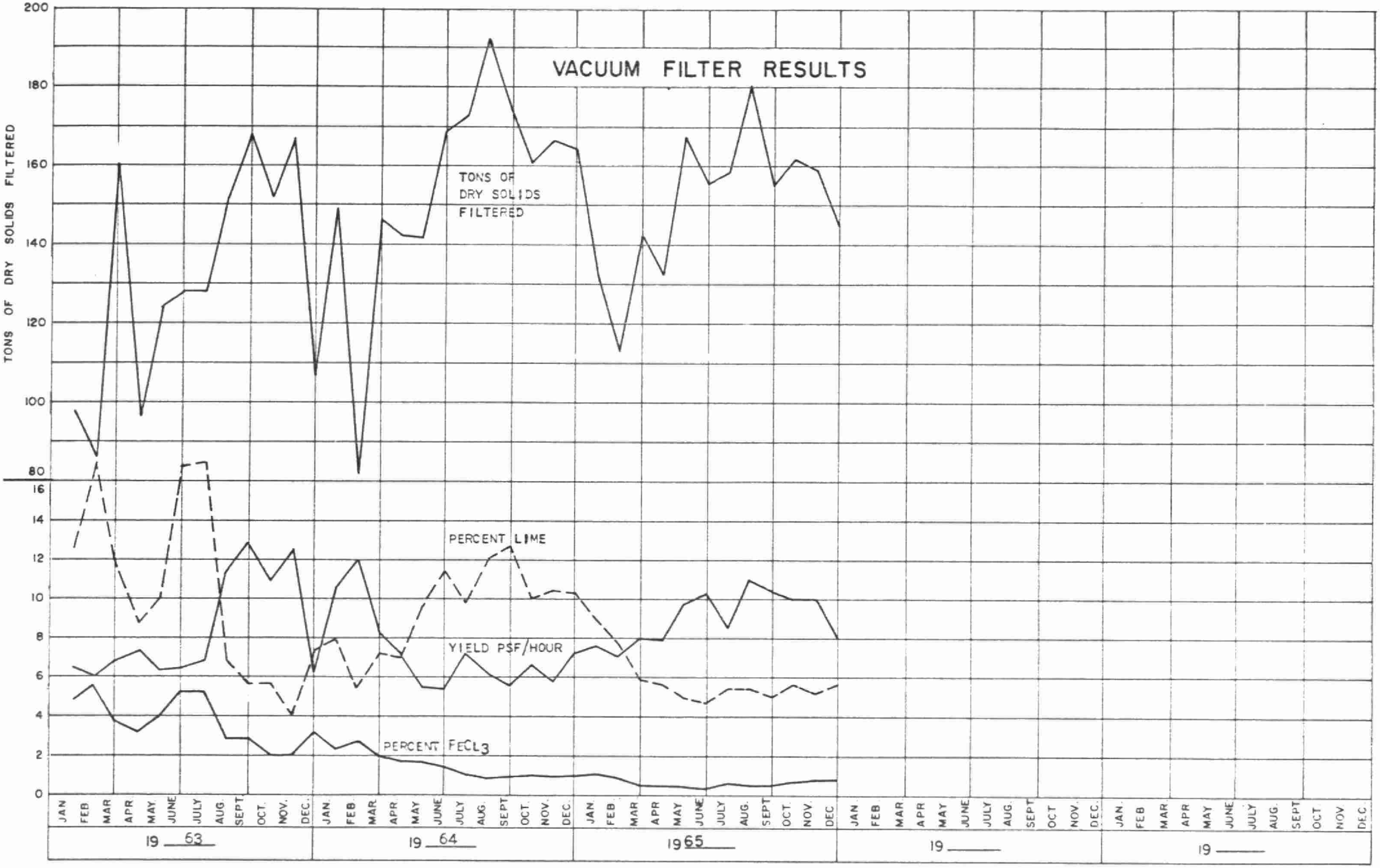
MONTH	B. O. D.				S. S.				GRIT
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	REMOVAL CU. FT.
JAN.	190	49	74. 0	146. 2	257	61	76. 0	202. 2	398
FEB.	*101	40	60. 5	50. 5	*124	50	59. 5	61. 3	648
MAR.	98	65	33. 5	36. 7	127	59	53. 5	75. 7	433
APR.	*101	40	60. 5	86. 6	*124	50	59. 5	105. 0	602
MAY	116	54	53. 5	78. 8	108	66	39. 0	53. 4	540
JUNE	*101	40	60. 5	58. 5	*124	50	59. 5	71. 0	371
JULY	84	63	25. 0	22. 2	70	36	48. 5	36. 0	510
AUG.	*101	40	60. 5	60. 3	*124	50	59. 5	73. 2	555
SEPT.	*101	40	60. 5	80. 1	*124	50	59. 5	97. 2	814
OCT.	49	14	71. 5	46. 3	104	28	73. 0	100. 5	420
NOV.	62	22	64. 5	60. 6	78	51	34. 5	40. 9	373
DEC.	110	16	85. 5	125. 0	124	51	59. 0	97. 1	424
TOTAL	-	-	-	863. 5	-	-	-	1047. 5	6088
AVG.	101	40	60. 5	72. 0	124	50	59. 5	87. 3	507

* Average values substituted

COMMENTS

Percent removal of 60. 5 and 59. 5 of BOD and SS repsectively is considered excellent for a primary treatment plant. Influent concentrations of BOD and SS indicate a weak sewage which is accounted for by the high volume of storm water reaching the sewer system.

The rather high volume of grit also indicates the presence of storm water.



VACUUM FILTER RESULTS
TONS OF DRY SOLIDS FILTERED
TONS OF DRY SOLIDS FILTERED
PERCENT LIME
YIELD PSF/HOUR
PERCENT FeCl3
200
180
160
140
120
100
80
16
14
12
10
8
6
4
2
0
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
19 63
19 64
19 65
19
19

VACUUM FILTER OPERATION

MONTH	FILTER HOURS #1	FILTER HOURS #2	% SOLIDS RAW SLUDGE	LBS. DRY SOLIDS FILTERED	LBS. LIME	% LIME	LBS. $FeCl_3$	% $FeCl_3$	% SOLIDS FILTERED SLUDGE	YIELD PSF/HOUR
JAN.	84.0	84.0	5.1	263636	23650	8.9	2641	1.00	22.4	7.60
FEB.	120.0	16.0	4.8	223005	17450	7.8	1951	0.87	23.0	7.10
MAR.	177.0	-	5.0	284293	16650	5.9	1489	0.52	22.5	8.00
APR.	115.0	39.0	5.0	264959	15150	5.7	1181	0.45	24.6	7.95
MAY.	89.0	87.0	6.1	334476	16800	5.0	1410	0.42	25.3	9.72
JUNE	77.0	77.0	6.2	311296	14800	4.7	1151	0.37	26.9	10.25
JULY	91.0	91.0	6.0	317023	17255	5.4	1819	0.57	28.4	8.55
AUG.	82.0	82.0	7.6	360687	19350	5.4	1914	0.53	25.7	10.95
SEPT.	74.0	74.0	7.0	310432	15600	5.0	1633	0.53	27.1	10.40
OCT.	80.0	79.0	6.4	323927	18250	5.6	2179	0.67	25.2	10.00
NOV.	81.0	81.0	6.7	318322	16450	5.2	2198	0.69	27.4	10.00
DEC.	80.0	80.0	5.8	291445	16200	5.6	2005	0.69	26.5	9.05
TOTAL	1150.0	790.0	-	3603501	207605	-	21571	-	-	-
AVG.	95.8	71.8	6.0	300292	17300	5.8	1798	0.60	25.4	9.13

COMMENTS

Vacuum filtration data is shown above.

The percent concentration of filtered sludge at 25.4% is good for this type of dewatering. The increase in suspended solids from 6.0% to 25.4% represents a reduction in volume by a factor of 4.3.

The percent of ferric chloride and lime used is quite low.

The good yield, low number of hours of operation and small quantities of chemicals is due to good operation and the good preconditioning in the aerated sludge holding tank.

Relatively low cost of filtration indicates overall excellence of operation.

VACUUM FILTER COSTS (MONTHLY)

MONTH	COST PER MONTH					TOTAL	COST PER TON DRY WEIGHT					TOTAL
	$FeCl_3$	LIME	LABOUR	ELEC	MAINT		$FeCl_3$	LIME	LABOUR	ELEC	MAINT	
JANUARY	243.50	399.08	440.00	131.82	52.73	1267.13	1.85	3.03	3.34	1.00	0.40	9.62
FEBRUARY	179.79	294.23	440.00	111.50	44.60	1070.12	1.61	2.64	3.95	1.00	0.40	9.60
MARCH	137.29	280.71	440.00	142.15	56.86	1057.01	0.97	1.97	3.10	1.00	0.40	7.44
APRIL	103.89	257.03	440.00	132.48	52.99	991.39	0.82	1.94	3.32	1.00	0.40	7.48
MAY	130.00	284.09	440.00	167.24	66.90	1088.23	0.78	1.69	2.63	1.00	0.40	6.50
JUNE	106.12	250.27	456.50	155.65	62.26	1030.80	0.68	1.61	2.93	1.00	0.40	6.62
JULY	167.71	290.85	456.50	158.51	63.40	1136.47	1.05	1.83	2.88	1.00	0.40	7.16
AUGUST	176.47	328.05	456.50	180.34	72.14	1213.50	0.98	1.82	2.53	1.00	0.40	6.73
SEPTEMBER	150.56	263.80	456.50	155.22	62.09	1088.17	0.97	1.70	2.94	1.00	0.40	7.01
OCTOBER	200.90	307.76	456.50	161.96	64.78	1191.90	1.24	1.90	2.82	1.00	0.40	7.36
NOVEMBER	202.66	277.32	456.50	159.16	63.66	1159.27	1.27	1.74	2.87	1.00	0.40	7.28
DECEMBER	184.86	273.94	456.50	145.72	58.29	1119.31	1.27	1.88	3.13	1.00	0.40	7.68
TOTAL	1988.75	3507.13	5395.50	1801.75	720.70	13413.30						
AVERAGE PER MONTH	165.73	292.26	449.62	150.15	60.06	1117.78	1.12	1.98	3.04	1.00	0.40	7.54

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	207.37	-	-
FEBRUARY	165.71	-	-
MARCH	222.63	-	-
APRIL	283.88	-	-
MAY	254.08	*3845	3.60
JUNE	191.78	10291	5.37
JULY	211.54	9965	4.71
AUGUST	197.82	9210	4.66
SEPTEMBER	262.71	10095	3.84
OCTOBER	264.40	9699	3.67
NOVEMBER	303.18	**1015	3.35
DECEMBER	266.00	-	-
TOTAL	2831.10	54120	-
AVERAGE	235.92	7731	4.28

* 13 days chlorination
** 3 days chlorination

COMMENTS

Plant effluent is chlorinated from March 15 to November 15 of each year.

During 1965, chlorination was required at a rate of 4.28 ppm to maintain a residual of 0.5 ppm after 15 minutes. This is low for this type of plant and is due to the relatively low BOD of the effluent.

CONCLUSIONS

Even though organic loadings on the plant are not excessive the volume of sewage exceeds design approximately 34% of the time and the plant is therefore overloaded on these occasions.

Relatively low cost of operation can be attributed to high flows and efficient operation particularly of the vacuum filters.

Overloading of the pumping station at Clark Creek has caused considerable plant staff maintenance time.

The population of Sault Ste. Marie has increased considerably in recent years and is now approximately 70,000. Discounting the high infiltration at certain times of the year, flows are as would be expected for a city of this size. If flows continue to increase at the present rate, the plant will be overloading early in 1967.

RECOMMENDATIONS

A program should be instituted to separate storm water from the sanitary sewer system. The peak storm flows are overtaking the firm pumping capacity of the Clark Creek pumping station. Steps should be taken to increase the pumping capacity.

Consideration should be given to increasing plant capacity in the very near future.

ONTARIO WATER RESOURCES COMMISSION